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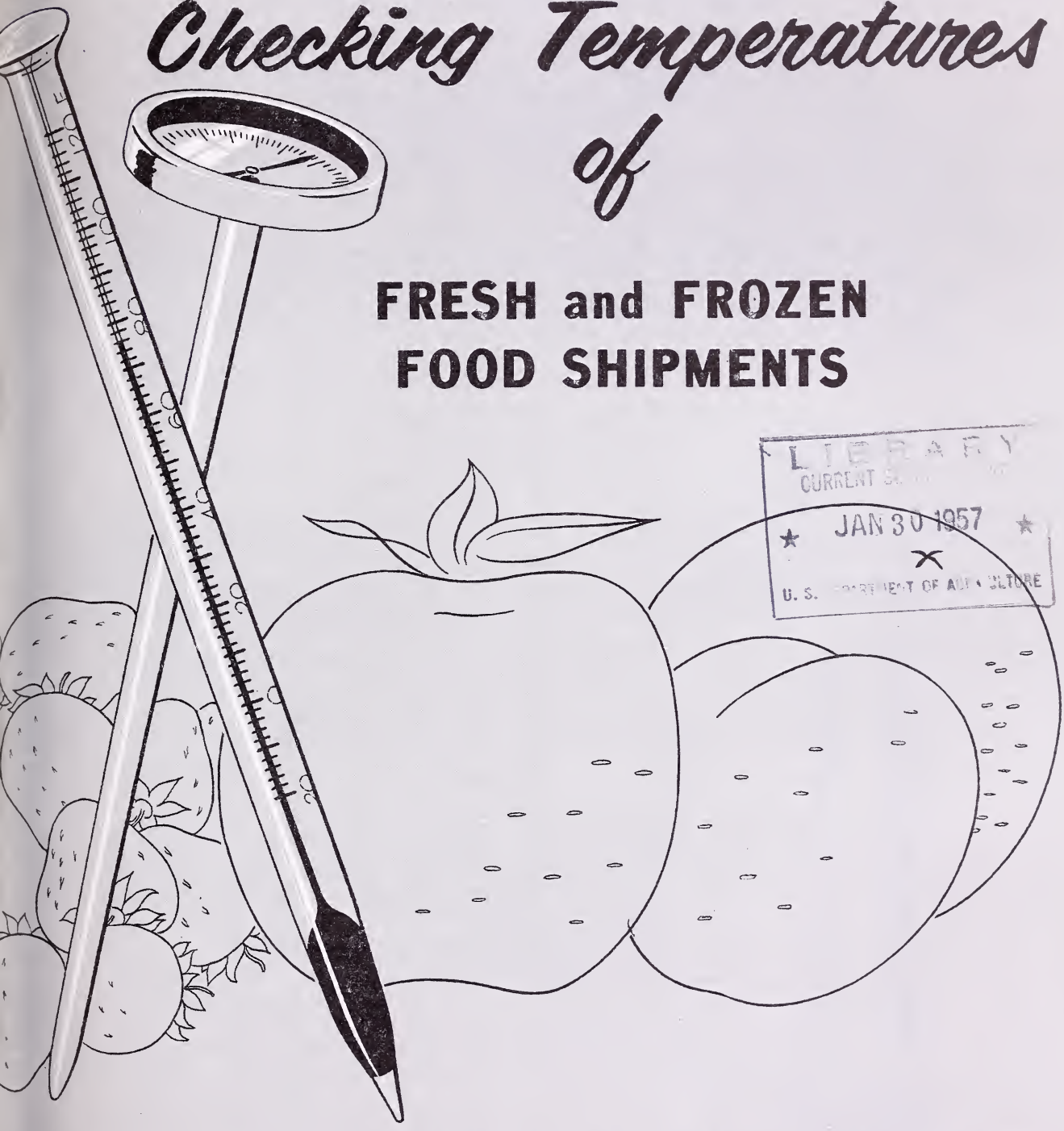
Suggested Methods for Checking Temperatures of FRESH and FROZEN FOOD SHIPMENTS



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SUGGESTED METHODS FOR CHECKING TEMPERATURES OF FRESH AND FROZEN FOOD SHIPMENTS

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Shippers, carriers, and receivers have expressed a growing interest in the maintenance of proper temperatures for the protection of fresh and frozen food products in transit. One way to make sure that products are at desired temperatures is to check the products before loading them into the car or truck and again upon arrival at destination. This checking can be done by taking the product temperatures in sample packages (boxes, crates, cartons, etc.).

TYPES OF THERMOMETERS

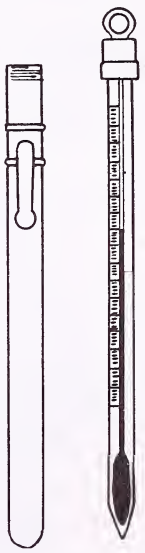
It pays to use a thermometer of good quality. Accurate temperatures cannot be expected from a poor one. Either a glass stem thermometer (fig. 1) or a metal dial thermometer (fig. 2) is recommended for taking the temperatures of frozen foods, chilled or frozen meat and poultry, fresh fruits, fresh vegetables, and dairy products, where the thermometer will be inserted less than 5 inches.

The glass stem thermometer (fig. 1) should have the following characteristics:

1. An overall length of approximately 5½ inches and a sharp pointed stem.

2. A temperature range of at least -20° F. to +120° F. for frozen foods, and +10° F. to +120° F. for chilled meat and poultry, fresh fruits, fresh vegetables, and dairy products. The high end of the range is suggested, so that, if desired, a record may be made of the ambient (outside) temperature at the time the commodity temperature is taken. Markings on the scale should be in 1° or 2° divisions.

3. A pocket carrying case to protect the thermometer.



NEG. 3736-56(12)

Figure 1.--Glass stem thermometer.

The metal dial thermometer (fig. 2) should have the following characteristics:

1. A stainless steel, pointed stem approximately 5 inches in length (for meats, 5 to 8 inches).

2. The same temperature range as for the glass stem thermometer.

3. A hermetically sealed dial.

4. A pocket carrying case to protect the thermometer.

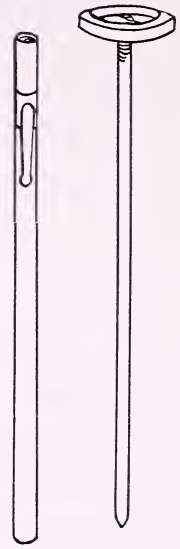


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Figure 2.--Metal dial thermometer.

A metal pointed thermometer (fig. 3) also is recommended for chilled meats with insertion less than 5 inches.

For meats, if the thermometer has to be inserted more than 5 inches, a metal dial thermometer with an 8-inch stem (see fig. 2), or a long stem armored one (fig. 4) should be used.

The metal pointed thermometer (fig. 3) should have the following characteristics:

1. An overall length of approximately 6 inches with a nickel-plated or stainless steel point.

2. A temperature range of at least +10° F. to +120° F., for chilled meats, with markings on the scale in 1° or 2° divisions.

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Figure 3.--Metal pointed thermometer.

The long stem, armored, thermometer (fig. 4) should have the following characteristics:

1. An overall length of approximately 11 inches with a nickel-plated or stainless steel point.

2. A temperature range of at least -20° F. to +120° F. for frozen meats and +10° F. to +120° F. for chilled meats.

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Figure 4.--Long stem, armored thermometer.

PROBE TO MAKE HOLE IN PRODUCT

It is necessary to make a hole in some products, particularly frozen items, in which to insert the thermometer. Make the hole with an ice pick, hand drill, or other pointed tool. The tool should be slightly larger in diameter (approximately 1/64-inch larger) than the diameter of the thermometer stem. This tool will be referred to hereafter as a probe.

PRECAUTIONS TO BE OBSERVED

Testing the Accuracy of the Thermometers

The thermometers used for checking the temperatures of food products should be tested every week, or as often as is necessary to insure their accuracy.

The test can be made by immersing the thermometer in an ice and water bath (fig. 5). Fill a pint-size container with chipped ice and then add water. Stir for 2 minutes and then immerse the thermometer for 2 minutes in the center of the mixture. (Do not permit the thermometer bulb to rest against the side of the container.) The thermometer should read within 1°, plus or minus, of +32° F.

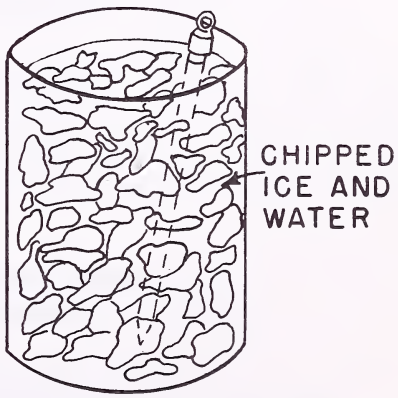

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Figure 5.--Ice and water bath to test accuracy of the thermometer.

Also, it is desirable to test the thermometer at other temperatures. For calibration at temperatures from 0° to -5° F., use a brine mixture consisting of 1 part of salt and 3 parts of chipped ice (fig. 6). Compare the thermometer being tested with a thermometer that is known to be accurate. Insert both thermometers into the brine mixture with the stems next to each other. (Do not permit either of the thermometer bulbs to rest against the side of the container.) Wait 2 minutes and then compare the readings.

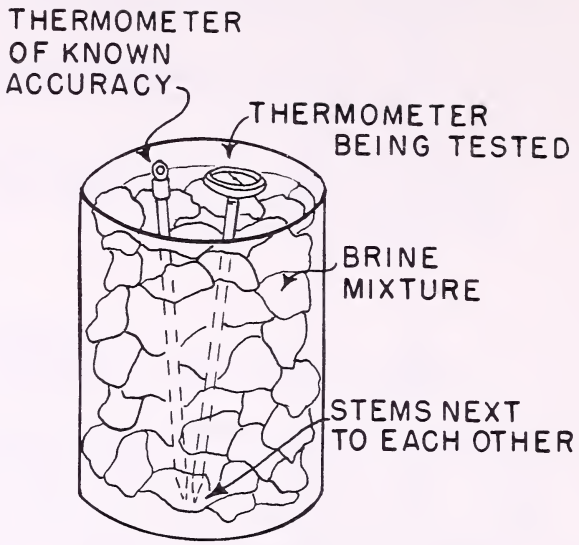


Figure 6.--Brine mixture to test accuracy of thermometer.

Care of Thermometer

If a thermometer is to give accurate results it must be handled carefully and should not be bent (if of metal), dropped, handled roughly, or exposed to temperatures beyond those shown on it. Do not use the thermometer as a tool, or probe.

Cleaning Thermometer and Probe

Both the thermometer and the probe should be cleaned thoroughly with soap or detergent before and after use to avoid contamination of the product.

Preventing Temperature Change in Test Packages

There should be no delay between the time a package is selected for test and the time a thermometer is inserted into the packaged product. For instance, if a test package were taken from the load and allowed to remain on the unloading platform for some time, the product temperature might change substantially before the temperature reading was made, especially during the summer or winter months.

TAKING TEMPERATURES OF FROZEN FOODS, FRESH FRUITS, FRESH VEGETABLES, DAIRY PRODUCTS, AND POULTRY

Use a glass stem thermometer (fig. 1) or metal dial thermometer (fig. 2) as described under *Types of Thermometers*.

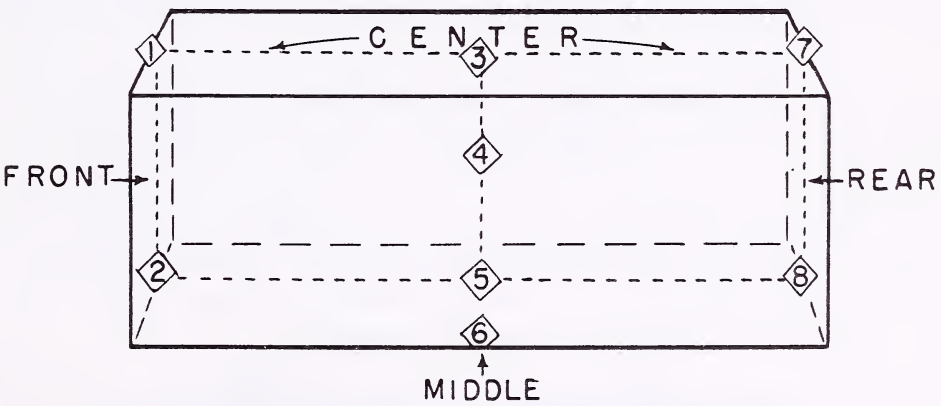
Step No. 1 - Equalizing the Thermometer and Probe with the Air Temperature

Do not allow the thermometer and probe to become unduly heated or chilled before using. At least 5 minutes before using, place them inside the car, truck, or warehouse where the product is stored in order to equalize their temperature with that of the air surrounding the product.

Step No. 2 - Selecting Test Packages

Test the product in several packages in the warehouse before the packages are loaded into the car or truck. Selecting the test packages is a matter of judgment, but select them in such a way that their temperatures will be representative of the entire load.

When unloading, test the product in packages taken from the locations shown in figure 7. These packages normally will give product temperatures which are representative of the load. The product in additional packages, however, may be tested, depending upon the type of product, appreciable variations of cold or hot weather en route, etc. Whether to test additional packages should be left to the judgment of the receiver.



1. *Top, front, center.*
2. *Bottom, front, center.*
3. *Top, middle, center.*
4. *Half way up, middle, center.*
5. *Bottom, middle, center.*
6. *Bottom, middle, side (next to door if there is a side door).*
7. *Top, rear, center.*
8. *Bottom, rear, center.*

Figure 7.--Suggested locations in the car or truck from which test packages should be selected.

For loads that contain fresh fruits or vegetables, which develop heat from respiration, take temperatures in additional packages from the center or inside of the load. For fresh fruits or fresh vegetables shipped in extremely hot or cold weather, take temperatures in additional packages from the side, floor, and door locations.

Step No. 3 - Taking the Temperature

Figure 8 shows 3 examples of the recommended method for taking temperatures. For larger products such as a frozen food package, an apple, or a cantaloup, the temperature can be taken by inserting the thermometer into one piece, or item, of the product. For small products such as cherries, plums, grapes, peas, etc., the temperature can be taken by inserting the thermometer into, or among, the items in the container. The same technique of precooling the thermometer and taking the temperature can be used for all products.

First, select a package at random from the load for use in precooling the thermometer. This will be referred to hereafter as the precool package. The product in this precool package is used to chill the thermometer stem before each insertion into a test package. Avoid inserting a warm thermometer into a test package, because it may give a misleading temperature reading.

Gently insert the point of the thermometer into the center of the product. If the thermometer cannot be inserted into the product by gentle pressure (as with frozen foods, for instance), make a hole to the center of the product by means of the probe.

Insert the thermometer into the hole and leave it there for at least 30 seconds. Do not remove it until you are ready to insert it into the test package.

Then remove the thermometer from the product in the precool package and immediately insert it a minimum of 2½ inches to the center of the product in the test package. Wait 60 seconds and read the temperature. If several packages are being tested, the thermometer can be left in each test package until the succeeding package is ready for testing.

TAKING TEMPERATURES OF CHILLED OR FROZEN MEATS

Use a glass stem thermometer (fig. 1), metal dial thermometer (fig. 2), metal pointed thermometer (fig. 3), or long stem, armored thermometer (fig. 4), as described under *Types of Thermometers*.

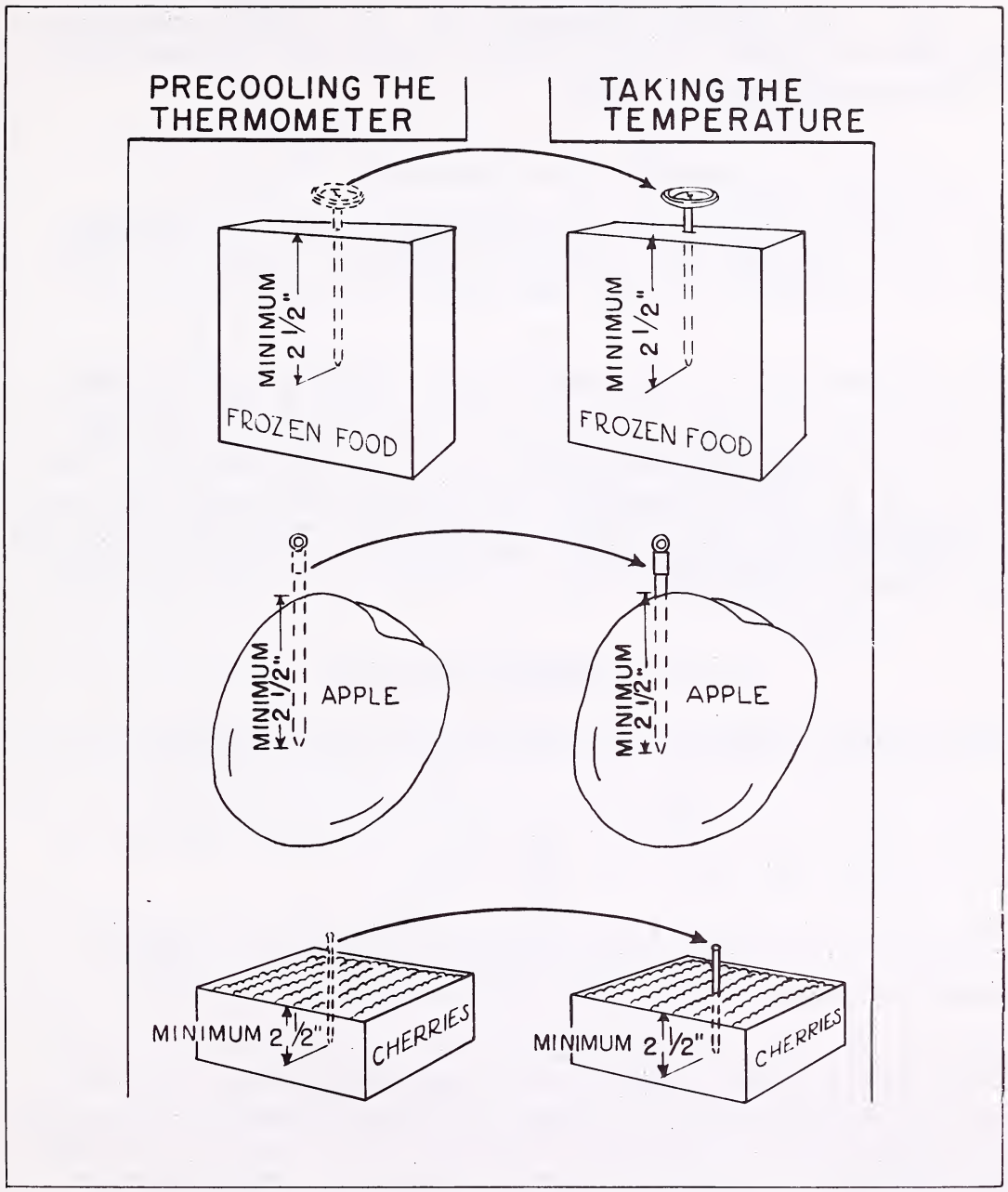


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Figure 8.--Precooling the thermometer and taking the temperature of frozen foods, fresh fruits, fresh vegetables, dairy products, and poultry.

Step No. 1 - Equalizing the Thermometer and Probe With the Air Temperature

Do not allow the thermometer and probe to become unduly heated or chilled before using. At least 5 minutes before using, place them inside the car, truck, or warehouse where the product is stored in order to equalize their temperature with that of the air surrounding the product.

Step No. 2 - Selecting Test Cuts

Test several pieces or cuts of meat in the warehouse before they are loaded into the car or truck. Selecting the test cuts is a matter of judgment, but select them in such a way that they will give representative temperatures of the entire load.

When unloading a car or truck shipment of meat in containers, or of stacked meat, make tests on meat taken from locations shown in figure 7. For a shipment of hanging meat, select a minimum of 3 test pieces--1 at the front, 1 at the middle, and 1 at the rear of the load. Tests on these cuts of meat will normally give temperatures which are representative of the entire load. Additional cuts of meat from other locations should be tested if there is an indication that any part of the load is not at the proper temperature. Whether additional tests are required is a matter for the judgment of the receiver.

Step No. 3 - Taking the Temperature

Figure 9 shows 2 examples of the recommended method for taking temperatures of frozen or chilled meat. The same method can be used for all cuts of meat.

First, select a cut at random from the load for use in precooling the thermometer (known as the precool cut). This precool cut is used to chill the thermometer stem before each insertion into the test cuts.

Make a hole to the center of the precool cut with the probe, avoiding any bones. Insert the thermometer into the hole and leave it there for at least 30 seconds. Do not remove it until you are ready to insert it into a test cut.

With the probe, make the first temperature hole to the center of the thickest part of the test cut, again avoiding any bones. Remove the thermometer from the precool cut and immediately insert it a minimum of 2½ inches (a minimum of 6 inches for long armored thermometer) to the center of the meat. Wait 60 seconds and then read the thermometer while it is still in the meat--this gives the temperature in the center of the cut.

The outside of a cut of meat will warm faster than the center. Since partially or fully defrosted meat is highly susceptible to deterioration, particularly at the surface, take a temperature reading near the surface also. To do this, make a

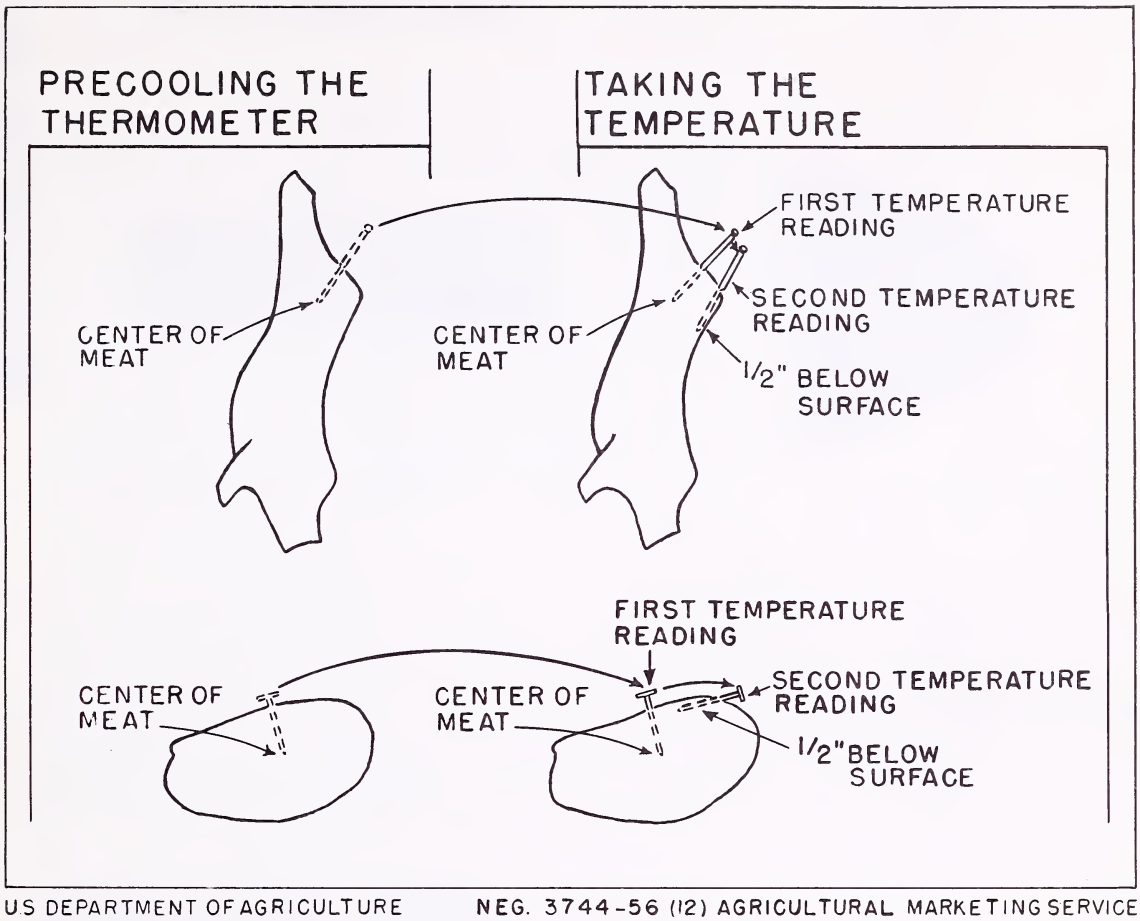

Figure 9.--Precooling the thermometer and taking the temperature of chilled and frozen meats.

second hole with the probe, parallel to, and ½-inch below the surface of the meat (fig. 9). Remove the thermometer from the first temperature hole and immediately insert it into the second temperature hole a minimum of 2½ inches (a minimum of 6 inches for the long armored thermometer). Wait 60 seconds and then read the thermometer while it is still in the meat--this will give the surface temperature.

If several cuts of meat are tested the thermometer can be left in the first, or deepest, temperature hole of each test cut until the succeeding cut is ready for testing.

RECOMMENDED PRODUCT TEMPERATURES

Suggested product temperatures may be found in Agriculture Handbook No. 105, *Protection of Perishable Foods During Transportation by Truck--Meats, Fruits, Melons, and Vegetables,* issued by the U. S. Department of Agriculture, Washington 25, D. C.

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